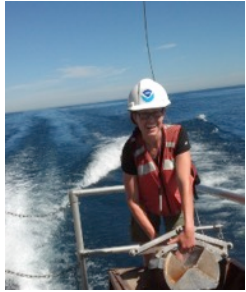
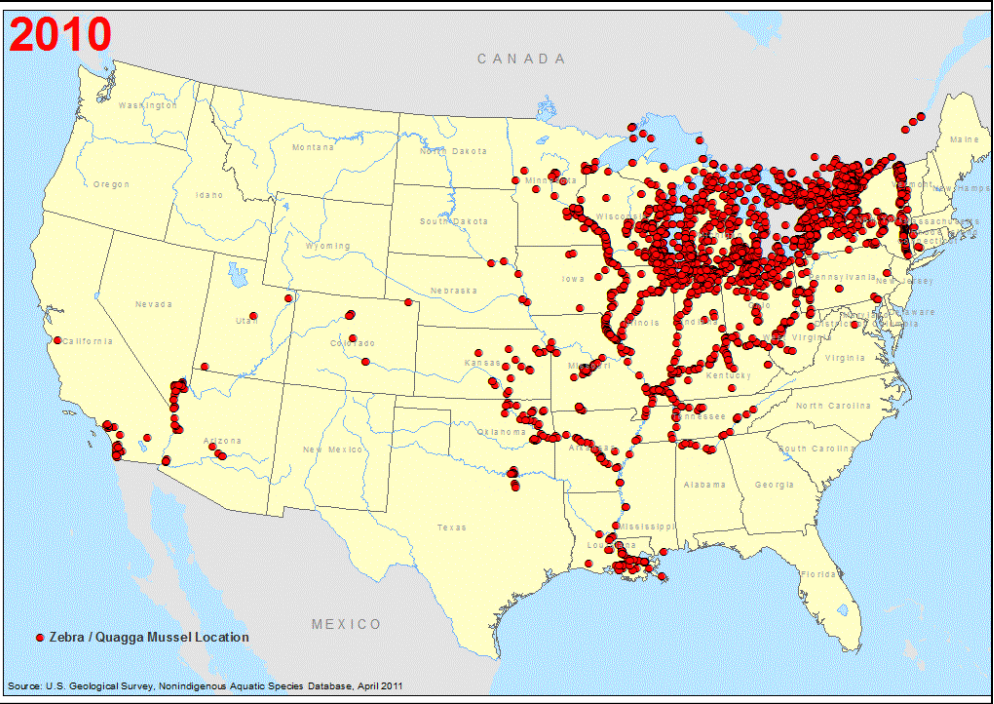


Dreissenid Mussel Population Dynamics & Processes

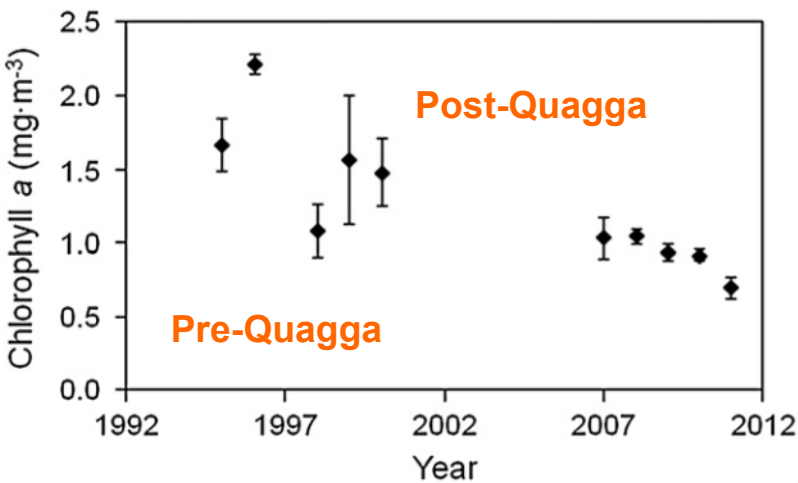
Ashley Baldridge
Ecosystem Dynamics



Invasive Dreissenid Mussels in the Great Lakes



Reduced primary production



Pothoven and Fahnenstiel (2013). *JGLR*.



Motivating Questions

- What is the status of mussels in the Great Lakes, and how is that changing?
- How are dreissenid mussels impacting the lower food web?
- How can we produce more accurate models to predict mussel populations?



GLERL Strategic Plan Research Path

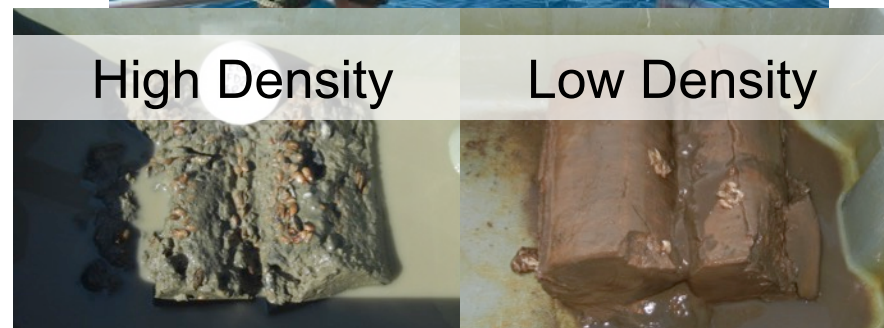
EcoDyn Path #3:

Continue to **monitor the status** of benthic macroinvertebrate and dreissenid mussel populations in Lake Michigan and **conduct experiments** to evaluate factors that affect mussel abundance, feeding, growth and condition in the Great Lakes as well as mussel impacts on Great Lakes food webs.

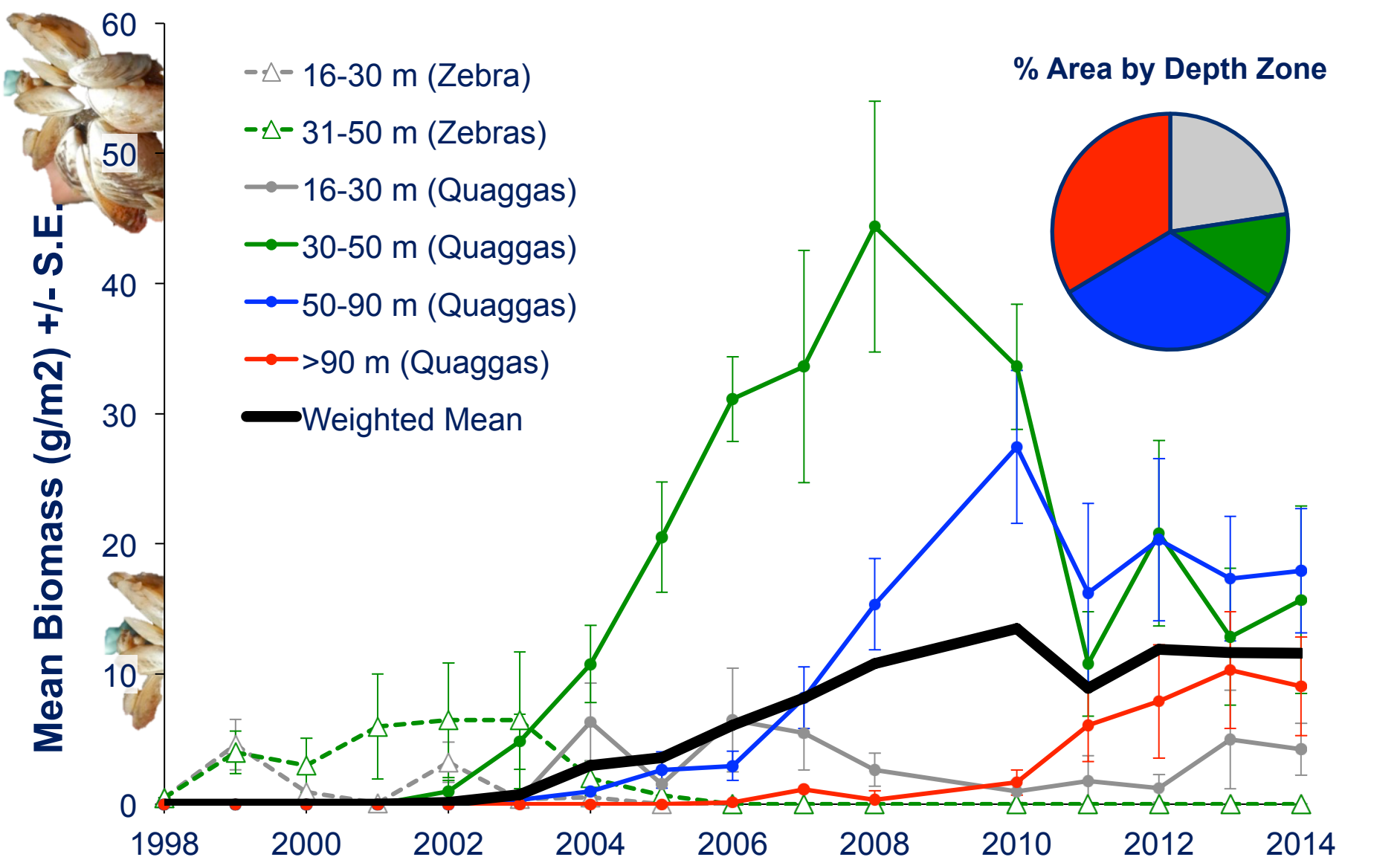


EcoDyn Mantra:

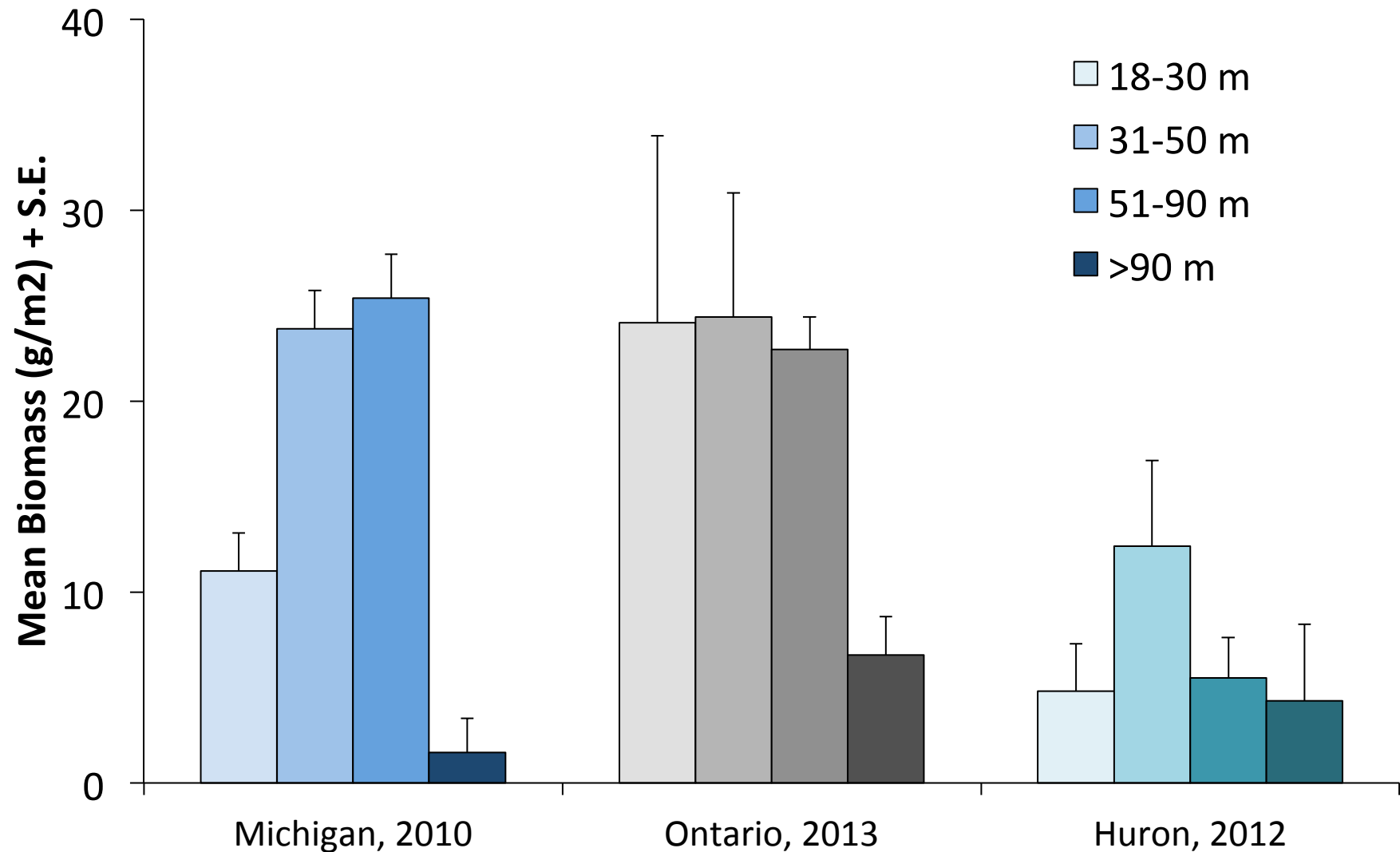
Observations → Experiments →
Concepts → Models/Applications



Southern Lake Michigan Invasive Mussel Population Trends



Cross-Lake Comparison: Invasive Mussel Biomass



Invasive Mussel Field Growth Experiment

GOALS

- Improve year-round growth estimates at relevant depths

DESIGN

- One tripod at 45 meters
- Measure mussel growth at 5 and 12 months

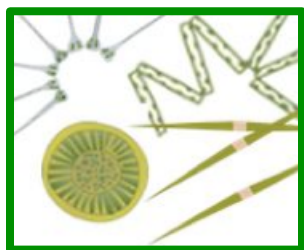
INITIAL FINDINGS/ CONCLUSIONS

- Small mussels grew 10% in length during the season
- Field growth experiment takes advantage of NOAA's unique vessel capabilities to produce more realistic year-round growth estimates.

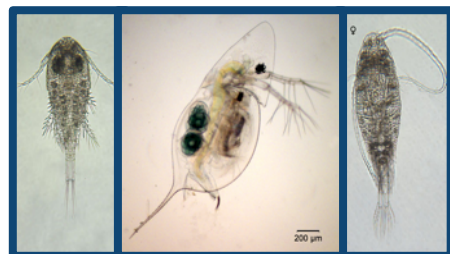


Examining relative impacts of climate change and invasive mussels on Lake Michigan zooplankton

Method: Path Analysis



- **Chlorophyll**
 - Total effect of dreissenid mussels is stronger than climate change
- **Zooplankton**
 - Most influenced by seasonal fluctuations in water temperature
 - Dreissenid mussels have negative effect as mediated through effects on Chlorophyll
 - Climate change not significant
 - Future work to explore differences among zooplankton taxa



Successes / Data Highlights

Promoting NOAAs involvement in projects beyond Lake Michigan

- **Lake Erie-** collaboration with USGS and University of Michigan to assemble a long-term mussel biomass record for Western Lake Erie. These data will be used in a HABs forecasting model.
- **Lakes Huron and Ontario-** We are proposing to lead the benthic surveys in 2017 and 2018 for the Cooperative Science and Monitoring Initiatives



GREAT LAKES
AQUATIC NONINDIGENOUS SPECIES
INFORMATION SYSTEM

Providing Data for Multiple Products

- **GLANSIS**
- **Great Lakes Aquatic Habitat Framework (GLAHF)**
- State of the Great Lakes 2017 Report
- Biophysical and ecosystem models (e.g., FVCOM, Ecopath w/ Ecosim)
- Post-doc and Graduate Student research projects (Mich. State, Univ. Mich., Grand Valley State Univ.)

Collaborations

Federal Partners

- EPA
- USGS
- NOAA NOS (Mussel Watch Program)
- Environment Canada

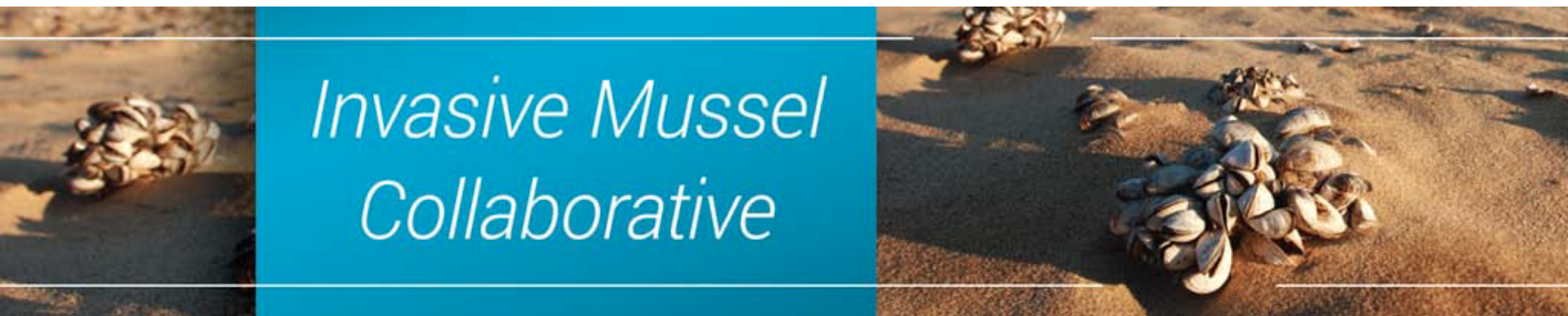


Academic Partners

- Univ. of Michigan (CILER, Water Center)
- Buffalo State College
- Grand Valley State Univ.
- Michigan State Univ.
- Eastern Michigan Univ.



Represent NOAA in the Invasive Mussel Collaborative: Co-lead of Science Team



IMC Mission

Advance scientifically sound technology for invasive mussel control to produce measurable ecological and economic benefits.

Provide a framework for communication and coordination, identify the needs and objectives of resource managers, prioritize the supporting science, recommend communication strategies and **align science and management goals into a common agenda for invasive mussel control.**

Future Directions

- Invasive mussel growth experiments:
 - Expand to deep and mid-depth stations of Lake Michigan in 2016
 - Incorporate into future research plans for Lake Huron (2017) and Lake Ontario (2018)
- Lake Winnipeg project to examine impact of new zebra mussel invasion on cyanobacteria community (links to HABs)
- Produce relevant estimates for parameters needed by the Dynamic Energy Budget model. Ultimately, this will improve predictions of quagga mussel biomass.



Questions?

